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ABSTRACT

In response to reports that have received widespread attention decrying the failure of science education in the United States to prepare sufficient numbers of scientists, projects have sought to determine what can be done to encourage academically oriented youths to enroll in more science courses in high school and preserve their option of going into a career in science. The purpose of this preliminary study was to test the adequacy of variables proposed by Fishbein and Ajzen's Theory of Reasoned Action as predictors of eighth grade students' intention to enroll in at least one elective science course in high school. Data were collected from 174 eighth grade students. According to the model, intention to perform a behavior is based on: (1) attitude toward behavior; and (2) subjective norms. In order to test this, the researcher opted to study the effects of several variables external to the model's theoretical constructs and to show how they are related to eighth-graders' intentions. Tested were the effects of gender, science grades, and science attitudes. Attitude toward the behavior and subjective norm in combination were found to be statistically significant as predictors of behavioral intention. Because actual enrollment data were not obtained, the results were considered preliminary. (CW)

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The Determinants of Eighth Grade Students' Intentions to Enroll in Elective Science Courses in High School

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The Deterinants of Eighth Grade Students' Intentions to Enroll in Elective Science Courses in High School

Introduction

Reports on education that have received widespread attention in recent years present particularly grim conclusions about the state of science education in the public schools of the United States. Several of the reports agree that the U. S. system of education is failing us in the preparation of sufficient numbers of highly qualified scientists and engineers (Lomon, 1983; Hufstedter and Langenberg, 1980; Talley, 1984). In response to these reports, many research projects have been initiated. Several of these projects have sought to determine what can be done to encourage academically-oriented youths to enroll in more science courses in high school and thus preserve the option of going into a career in science or engineering (Deboer, 1984; Matyas, 1984; Milner, Ben-Zvi, and Hofstein, 1986; Thomas, 1986). The findings of these studies, however, have provided no clear solutions.

Academically-oriented students are not the only ones who need to take more than the currently required number of science courses in high school. Students who do not intend to go on to a 4-year college believe that they do not needed to take much science in high school. This belief is reinforced by the majority of our nation's high schools requiring only one or two years of science for graduation. But due to our nation's changing employment picture, science jobs that demand high-level college training will be vastly out numbered by jobs that require community college or technical institute training. The persons employed in these jobs will function as technicians supporting the work of professional scientists and engineers. However upon leaving high school, the majority of students are not prepared to enter the postsecondary programs intended to prepare them for these careers (Koval and Staver, 1985).

While the high school years might seem to be the most logical period at which to affect the science course selection of our nation's youth, the junior high school years have been most recently recognized as particularly important (Hurd, 1978). It is during this period that

students are beginning to make decisions and select courses which directly affect the range of careers which will subsequently be open to them.

Purpose

The purpose of this preliminary study was to test the adequacy of variables proposed by Fishbein and Ajzen's Theory of Reasoned Action, in contrast to more traditional variables, as predictors of eighth students' intentions to enroll in at least one elective science course such as chemistry or physics in high school. By studying such variables as gender, ability-grouping, achievement in science, attitude toward science, and support from others, attention may be focused on the variables which are highly related to the intentions of eighth grade students to enroll in elective science courses during the high school years.

Theoretical Framework

Fishbein and Ajzen's (1975) Theory of Reasoned Action was the model used for this study. The model was designed to better understand and predict human behavior. It is based on the assumption that "humans are rational animals who systematically utilize or process the information available to them" and that "the information is used in a reasonable way to arrive at a behavioral decision" (Fishbein, 1980). The model's weakness lies in its inability to account for human behaviors that are not volitional in nature.

According to this model, the prime determinant of behavior is one's behavioral intention and the strength of one's intention to perform a behavior is a function of two factors: (1) beliefs about the consequences or outcomes of performing the behavior and the evaluations of those consequences and (2) subjective normative beliefs about what others think the individual should do and the individual's motivation to comply with those beliefs.

The following equation (Fishbein and Ajzen, 1975) expresses the relation between one's intention to perform a behavior and the two factors:

$$B \approx BI = \sum_{i=1}^{n} (b_i e_i) \beta_1 + \sum_{j=1}^{m} (nb_j mc_j) \beta_2$$

where B is overt behavior, BI is the intention to perform the behavior, b_i is the belief (perceived probability) that performing the behavior will lead to consequence i, e_i is the evaluation of consequence i, nb_j is the perceived expectation of referent group or individual j, mc_j is the motivation to comply with referent j, n is the number of salient consequences, m is the number of salient normative beliefs, and β_1 and β_2 are empirically determined regression weights.

Fishbein and Ajzen (1975) proposed that $\Sigma (b_i e_i)$ is an index of a person's attitude toward the behavior (A_b), which should not be confused with attitude toward an object (e.g., science). In concert with the model, attitude can be measured either directly, by asking a person to rate the performance of the behavior on a semantic differential scale, or indirectly, by summing the product of each salient belief score, $b_i e_i$.

Furthermore, they have theorized that the second predictive component, $\Sigma (nb_j mc_j)$, represents the person's subjective norm (SN) or his perception of the social pressure to perform or not perform the behavior. Like attitude toward the behavior, subjective norm can be measured directly or by summing the product of each salient referent score, $nb_j mc_j$.

The theory of reasoned action has been found to be extremely successful in explaining diverse human behaviors such as drinking, dieting, choosing a career, and product purchasing (Ajzen and Fishbein, 1980). In education, it has been used to gain information about the intentions of eighth grade students to enroll in a ninth grade science course, assuming science to be an elective rather than a required course during the ninth grade (Coe, 1986).

Experimental Design and Hypotheses

The relationship between variables and the intentions of junior high school students' to enroll in at least one elective science course in high school are hypothesized to be mediated by the model's theoretical constructs. (See Figure 1). Therefore, variables external to the model will be related to intention only to the extent that they are related to A_b or SN, or their relative weights. In order to test this hypothesis, in addition to others derived from the model, it was necessary to study the relationships between several variables external to the model and the models' theoretical constructs and to test the relationships between the model's theoretical constructs and the intentions of eighth graders to enroll in at least one elective science course in high school. The choice of variables external to the models' theoretical constructs was based on previous studies undertaken to identify factors that are significantly related to students' decisions to enroll in science courses.

Tested were the relationships between the subjects' gender, academic abilities, science grades, and attitudes toward science and the model's theoretical constructs. The selection of gender as a variable was prompted by recent attention given to the disproportionate enrollment of males and females in high school science courses (Yockell and Lobonc, 1981; Thomas 1986). Previous study of the other variables selected (e.g., Coe, 1986; Deboer, 1984 on academic ability; Matyas, 1984; Milner, Ben-Zvi, and Hofstein, 1986 on attitude; Deboer, 1984; Thomas, 1986 on grades) failed to demonstrate consistent relationships with science enrollment. In line with the model, these variables are expected to be predictive of one's intention to enroll in at least one elective science course in high school to the extent that they are related to A_b or SN, or their relative weights. This hypothesis was tested using simple and multiple regression analysis with gender, academic ability, science grades, and attitude toward science serving as the independent variables and BI, A_b, and SN, as the dependent variables in separate tests of significance.

The remaining experimental hypotheses are directly related to the theoretical model and may be summarized as follows:

1. The combination of attitude toward the behavior (A_b) and subjective norm (SN) will prove to be significant in the prediction of behavioral intention (BI).

2. Attitude toward the behavior (A_b) and subjective norm (SN) will contribute equally in the prediction of behavioral intention (BI).

3. The sum of salient belief scores ($\Sigma (b_i e_i)$) will prove to be significant in the prediction of attitude toward the behavior (A_b).

4. The sum of salient referent scores ($\Sigma (nb_j mc_j)$) will prove to be significant in the prediction of subjective norm (SN).

Methodology

The research was carried out in two phases. The first phase consisted of exploratory work necessary to develop the final instrument which was administered in the second phase of the study. A measure of attitude toward science and the final instrument were administered during the same week in April, 1986 that the subjects registered for courses to be taken during their freshman year of high school.

Sample

The sample consisted of 174 students, 94 female and 80 male, attending the only junior high school in a suburban school district in Central Texas. The sample was generated by asking three eighth grade science teachers to randomly select three of their classes to participate in the study. Seven of the classes contained students of average abilities, although some of the students participated in the district's gifted and talented program. The two other classes were designated as basic classes, intended for low ability students. Criteria for placing students in basic classes are previous grades, teacher recommendations, and standardized test scores.

The average age of the students who participated in the study was 13 years. Thirty-three students were identified as academically talented; 112 as average; and 27 as basic students. The

ethnic composition of the sample was 3 Black, 19 Hispanic, and 152 Anglo.

Exploratory Work

A subset of the sample (N=58) was asked to list both positive and negative outcomes or consequences of enrolling in at least one elective science course such as chemistry or physics in high school. One hundred forty-seven statements were generated and classified into 15 categories. One category contained 6 statements that could not be classified by the researcher as outcomes or consequences of enrolling in elective science courses in high school. To determine the reliability of the scheme used to classify the statements into the 15 categories, 20 statements were chosen at random and presented to the three eighth grade teachers whose classes participated in the study. The teachers were instructed to use a common procedure to classify the same statements. When the statements were classified independently by each of the three teachers and compared with the investigator's classification of the statements, the agreement percentages were 55, 85, and 75. The mean agreement percentage of the teachers was 71.6. The categories and number of statements classified into each of the 15 categories are presented in Table 1. These categories were used to generate the behavioral belief and evaluation statements for the final instrument.

The same 58 subjects were also asked to list people or groups who might have expectations about whether or not they should enroll in at least one elective science course such as chemistry or physics in high school. Ninety-four persons or groups were listed and organized into ten categories. The reliability for the classification scheme used was established in the same manner as described above. The average percentages between the teachers' and the investigator's classification of the referents were 80, 90, and 95, with a mean agreement percentage of 88.3. The referents and number of each referent classified into each of the ten categories are shown in Table 2. These categories of referents were used to generate the normative belief and motivation to comply statements for the final instrument.

Final Instrument

Eighth grade students (N=42) enrolled in the same school as the subjects but not participating in the study were asked to respond to a set of 16 bipolar, adjective scales on which

behavior to enrolling in at least one elective science course such as chemistry or physics in high school was evaluated. The data collected from the students were subjected to factor analysis. The factor analysis was performed to determine if concept-scale interactions could adversely affect the validity of the measure of A_b (Fishbein and Ajzen, 1975). On the basis of the factor analysis (principle component analysis, varimax rotation of factors with eigenvalues greater than one), the following evaluative scales were used to measure A_b: good-bad, beneficial-harmful, valuable - worthless, pleasant-unpleasant. All four scales had loadings greater than 0.50 on the evaluative dimension.

The questions on the final instrument were phrased and scaled exactly as recommended by Ajzen and Fishbein (1980, Appendix B). All the predictive components were measured on 7-point scales. Examples of the measures are:

1. Behavioral intention (BI) (I intend to take at least one elective science course such as chemistry or physics in high school...) was measured on a likely-unlikely scale.

2. Attitude toward the behavior (A_b) (My taking at least one elective science course such as chemistry or physics in high school is...) was measured by summing the responses to the four evaluative scales described above.

3. Belief about the behavior (b_i) (My taking at least one elective science course such as chemistry or physics in high school will help me get into college...) was measured on a likely-unlikely scale.

4. Evaluation of the consequences (e_i) (Getting into college is...) was measured on a good-bad scale.

5. Subjective norm (SN) was measured on a scale anchored by "People who are important to me and whose opinions I value think I should..." and "... people who are important to me and whose opinions I value think I should not take at least one elective science course such as chemistry or physics in high school."

6. Normative beliefs (nb_j) (My science teacher thinks I should take at least one elective science course such as chemistry or physics in high school...) was measured on a likely-unlikely scale.

7. Motivation to comply (mc_j) (Generally speaking, I want to do what my science teacher thinks I should do...) was measured on a likely-unlikely scale.

All scales were scored from 1 (unlikely, bad, or not motivated to comply) to 7 (likely, good, or motivated to comply). $\Sigma (b_i e_i)$ and $\Sigma (nb_j mc_j)$ were obtained by multiplying the score on each belief question by the score on the corresponding evaluation or motivation to comply question and then summing the products for all beliefs.

Attitude toward Science Measure

The 50-item, Likert-type Wareing Attitudes Toward Science Protocol (WASP) was used to assess the subjects' attitudes toward science. Fully described elsewhere (Wareing, 1982), the instrument was developed for use with fourth graders through young adults. Using the Spearman-Brown formula, the estimates of reliability reported by the developer ranged from 0.91 to 0.94. Item-total correlations and validity data were not reported by the developer. Face validity of the scale is evidenced by the explicit or implicit reference to science in all statements. In the present investigation, the scores ranged from 143 to 241 and the Kuder-Richardson 21 reliability coefficient for the scale was reported at 0.86. Representative of statements that are found on the scale are:

"People live healthier lives because of science." (positive statement/explicit reference to science)

"Science is quite boring." (negative statement/explicit reference to science)

"We should not have sent people to the moon." (negative statement/implicit reference to science)

Results

The external variables of gender, ability-grouping, science grades, and attitude toward science were tested to determine their relationship with the subjects' intentions, attitudes toward the behavior, and subjective norms. Results of tests using simple regression analysis showed that

the variables external to the model when considered independently are not correlated with the three theoretical constructs. The results of tests using multiple regression analysis showed statistically significant correlations between attitude toward the behavior and two sets of combinations of the external variables. The results of these tests are presented in Table 3.

The effect of attitude toward the behavior and subjective norm on the prediction of behavioral intention was tested using multiple regression analysis. Attitude toward the behavior and subjective norm separately and in combination were found to be statistically significant in their prediction of behavioral intention, with attitude toward the behavior contributing more than subjective norm. The results of the test of the model and the contributions of attitude toward the behavior and subjective norm are summarized in Table 4 and Table 5, respectively.

Multiple regression analysis was used to test the significance of the relationships between attitude toward the behavior and the products of behavioral belief scores and between subjective norm and the products of normative belief scores. Tests were performed for the full models and models consisting of only variables with significant regression weights ($B \geq .05$). Results of all the tests proved to be statistically significant and are presented in Table 6. The variables included in the full models and the reduced models are presented in Tables 7 and 8.

Summary and Conclusions

The identification of students likely to pursue the study of science in school has largely focused on predictors such as gender, course grades, academic ability, and attitude toward science. The findings of this study raise questions regarding the exclusive use of such variables in the prediction of intentions to pursue the study of science in school. All of the traditional variables tested in this study, either singularly or in combination, failed to adequately predict the intentions' of the sample to pursue the study of science in school.

In comparison, the findings do support the usefulness of variables hypothesized by Fishbein and Ajzen's model in predicting students' intentions. The eighth graders' intentions to enroll in at least one elective science course such as chemistry or physicsin high school were

found to be a function of both the attitude toward the behavior and subjective norm. Attitude toward the behavior and subjective norm, either separately or in combination, were found to predict behavioral intention with a high degree of accuracy. Attitude toward the behavior and subjective norm were also found to be significantly related to the products of behavioral belief scores and the products of normative belief scores, respectively.

It is necessary to understand some of the implications of the present model in order to fully appreciate the findings. The model provides an explanation for, and an extension to, prior attempts to base the prediction of science course enrollment on a number of traditional variables. According to the model, course grades, academic ability, attitude toward science and other similar variables are suspected not to be correlated with one's intention to enroll in elective science courses, and thus the actual decision to enroll, because they fail to affect the predictors of intention, that is attitude toward the behavior and subjective norm.

Unexplained by the model are the statistically significant correlations found between attitude toward the behavior and combinations of traditional variables: (1) science grades and academic ability and (2) science grades, academic ability and attitude toward science. Any reasons that might be offered at this time for the relationships between these variables and attitude toward the behavior would be unfounded speculation. These findings, however, do suggest a need for further testing of the model with eighth graders and other groups of students.

The absence of a statistically significant correlation between behavioral intention and attitude toward science has implications for those who are inclined to infer that a change in attitude toward science will affect science related behavior. The demonstration of a change in attitude toward science as a result of an intervention is suspected not to be correlated with behavioral change (Fishbein and Ajzen , 1975). According to the model, behavioral change is expected to be produced by changing behavioral intention. This change in turn is dependent on the ability of the intervention to affect attitude toward the behavior, subjective norm, or their relative weights.

In order to gain further insight into the meaningful contribution of each variable on the prediction of attitude toward the behavior and subjective norm regression analysis was used. For each step in the solution, the independent variable with the least significant β-value was deleted from the regression equation one at a time. When investigating the determinants of attitude toward the behavior and subjective norm, it was found that a number of variables may be deleted from the regression equations without resulting in meaningful or significant losses in the explained variance. These findings suggest that the behavioral belief, normative belief, evaluation of consequences, and motivation to comply components of the final instrument may be shortened considerably without compromising the instrument's usefulness. Behavioral beliefs regarding grade point average, getting into college, and other elective courses proved to be the only variables remaining in the regression equation on attitude toward the behavior with statistically significant β-values. Remained in the regression equation on subjective norm with statistically significant β-values were the variables parents and college admissions officials . Only data gathered from use of this proposed shortened version of the instrument will provide the evidence necessary to support or refute this claim.

The results of these same regression tests also provide information useful in designing interventions to persuade students representative of the target audience to enroll in elective science courses during the high school years. The regression of normative beliefs on subjective norm tells us that parents and college admissions officials are highly significant referents regarding the behavior of enrolling in elective science courses in high school. These persons should be alerted to this fact so that they may use their positions to encourage the desired behavior. The regression of behavioral beliefs on attitude toward the behavior suggests that the subjects believe that enrolling in one elective science course in high school will substantially impact their choices of electives, their grade point averages, and the likelihood of being admitted to college. Given these findings, it would seem wise in a persuasive message to reinforce the belief that taking at least one elective science courses in high school may help one get into college. Conversely, the beliefs that taking one elective science course in high school will lower one's grade

point average or limit one's choice of electives should be attacked or at least presented in a favorable light.

Although the findings of this study provide support for the model, it could be argued that the inter-correlations among the variables reported may best be explained by demand characteristics of the the experimental situation (see Orne, 1969). However, it must also be suggested that the hypothesized and obtained inter-correlations go well beyond the insight into the experimental hypotheses that a subject can attain during the experimental sessions. Under the operation of demand characteristics it would seem reasonable to find that several of the variables external to the model are correlated with behavioral intention to the same degree that behavioral intention was found to be correlated with attitude toward the behavior and subjective norm.

Furthermore, it may be argued that the findings could be explained by differential method variance. However, if differential method variance had been operating than the correlation reported between intention and subjective norm should have been higher than the correlations reported between intention and all other variables. The reason for this is because behavioral intention and subjective norm were both measured using single-item, 7-point semantic differential scales. But, this was not the case. The correlation between intention and attitude toward the behavior was higher than between intention and subjective norm. Also refuting the influence of differential method variance on the relationship among the variables associated with the model are Koballa's (1986) findings. He found that the correlations between behavioral intention and other variables associated with and not associated with the model did not differ significantly when behavioral intention scores measured as percentages were substituted for scores from a seven-point semantic differential scale.

While not addressed in this study, an issue of great concern to the usefulness of the model is the expected correspondence between behavioral intention and behavior. In accordance with the model, the effects of the attitude toward the behavior and subjective norm on actual behavior are held to be mediated by behavioral intention. The prediction of behavioral intention is, therefore, a necessary condition for the prediction of behavior. Nevertheless, a high correlation between

behavioral intention and behavior will not always be found. Among other things, the more general the behavioral intention (in terms of the action, target, and context) and the greater the time interval between the measurement of intention and the actual behavior, the weaker the relationship between behavioral intention and behavior is likely to be. In attempting to predict behavior, it is the responsibility of the researcher to ensure that the conditions under which behavioral intention is measured will improve the likelihood of a high correlation with behavior. Thus, measuring behavioral intention as close in time as possible to the actual performance of the behavior should enhance the accuracy of the prediction.

In this study, care was taken to identify the behavioral object as precisely as possible. The action component is noted by the verb "to enroll." The target of the behavior is "at least one elective science course such as chemistry or physics." And "in high school" is the contextual component of the behavior.

Proving to be quite elusive was the factor of time, specifically the time between the measurement of intention and the students' actual enrollment in an elective science course in high school. At first glance, one might think it easy to check the subjects' course registration forms against their intention scores, especially since behavioral intention data were collected within days of the subjects registering for courses to be taken during their freshman year. Mitigating against the reliability of the findings obtained by this procedure are the elective course offerings available to students. In the school district in which this study was conducted students are required to take physical science as freshman and biology as sophomores. Two years will elapse before behavioral data can be collected. Thus, the intentions measured at the time of this study may have changed by the time the students actually register for courses to be taken during their junior year. (Changes in behavioral intention are likely to occur when new information causes changes in either attitude toward the behavior, subjective norm or the weight of these predictors.) It is obvious that subsequent studies employing this model to predict science course enrollment must grapple with this concern. Nevertheless, the findings of this study will enable school district personnel to identify the eighth graders who have favorable and less than favorable

intentions toward enrolling in elective science courses such as chemistry or physics in high school. Having this information well in advance of the time when decisions are made to enroll in these courses, it is hoped that interventions intended to increase the enrollment in elective science courses can be designed and implemented.

Contrary to what is suggested by the model used in this study, recent research has revealed variables that have effects on behavior that are not mediated by behavioral intentions. These variables are most evident when the performance of a behavior is contingent on the presence of appropriate opportunities or the possession of adequate resources such as money or time. In attempting to account for these variables, modifications have been proposed to the model by a number of researchers (see Chaiken and Stangor, 1987, pp. 584-585). In fact, one of the authors of the Theory of Reasoned Action, Icek Ajzen, has added a third component to the model intended to tap the person's perceptions that might prevent the behavior from being carried out. This additional independent predictor, called "perceived control," has been shown to effect behavior directly and indirectly through behavioral intention (Schifter and Ajzen, 1985). Science educators contemplating the use of the Theory of Reasoned Action to better understand and predict science course enrollment and other science-related behaviors would be wise to review the recent revisions to this model.

Because of the time that must pass before actual enrollment data can be obtained and the inability of the model to account for situational and internal obstacles to performing the behavior, although not seemingly important when considering elective science course enrollment, the results of this study must be considered preliminary. Nevertheless, it is important to note that this study provides support for several hypotheses derived from the Fishbein and Ajzen model. In doing so, it raises questions regarding the variables traditionally used to understand and predict science course enrollment. It is hoped that the findings of this study will cause science educators to reevaluate their thinking regarding the factors likely to impact students' intentions to enroll in elective science courses in high school.

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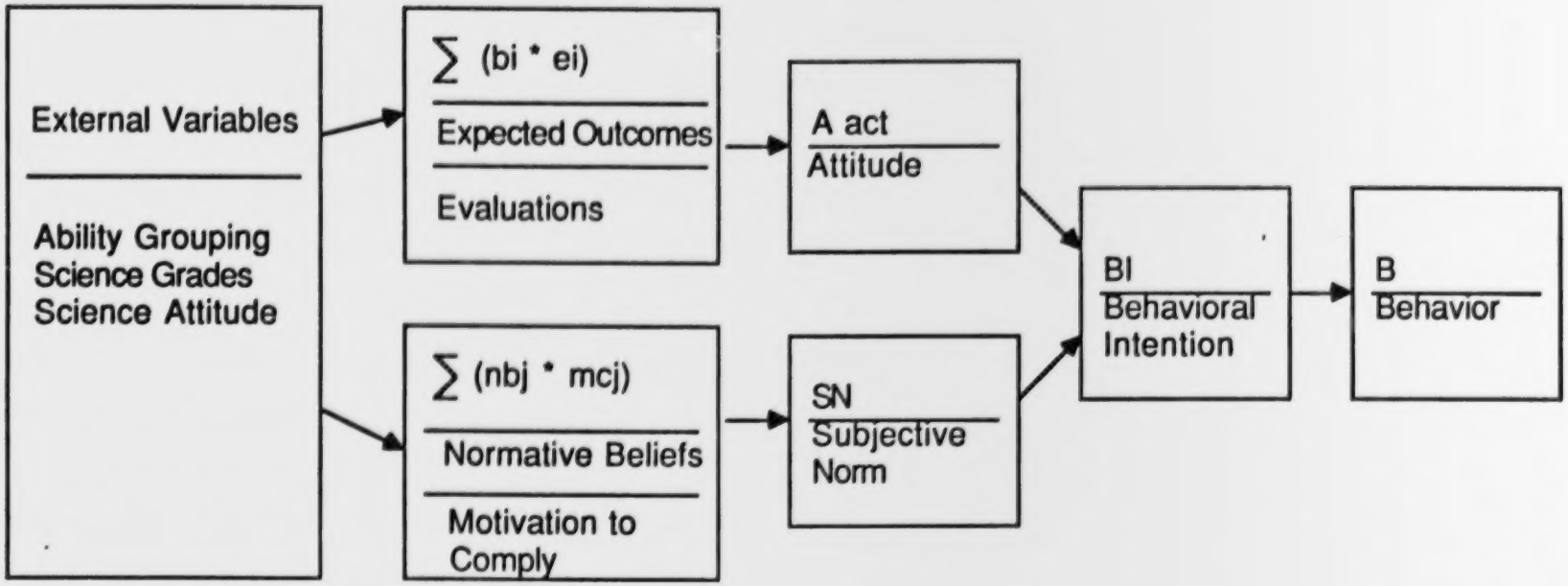

Fig. 1. The Fishbein and Ajzen model of reasoned action.

Table 1

Stated Outcomes or Consequences Used to Form the Belief and Evaluation Statements

Enrolling in one elective science course such as chemistry or physics in high school will . . .	Number of Statements
1. help me prepare for a future career in science.	23
2. cause me to do a lot of homework.	21
3. help me get into college.	16
4. prevent me from engaging in extracurricular activities (if I fail).	14
5. cause me to be in a course that is more difficult than other courses.	12
6. necessitate my taking additional mathematics courses.	12
7. lower my grade point average.	10
8. help me gain new knowledge about science and the world.	9
9. prevent me from taking other elective courses.	8
10. cause me to be in classes with few girls.	5
11. prevent me from graduating from high school on time.	4
12. force me to study a lot.	3
13. prevent me from being with my friends.	2
14. cause me to work with dangerous materials.	2
15. Statements not classified into the above categories.	6

Table 2

Referents Used to Form the Normative Belief and Motivation to Comply Statements

Persons who are likely to influence my decision about enrolling in one elective science course such as chemistry or physics are . . .	Number of Statements
1. my parents (father and/or mother).	31
2. my science teacher.	20
3. high school students.	10
4. college admissions officials.	9
5. my close friends.	8
6. my siblings (brother and/or sister).	5
7. scientists.	4
8. my doctor/dentist.	2
9. my grandparents (grandfather and/or grandmother).	8
10. Statements not classified into the above categories.	3

Table 3

Relationship of External Variables to Intention, Attitude Toward Behavior, and Subjective Norm

Dependent Variables	Independent Variables	Correlation Coefficient	F-ratio	Prob.
	Gender (A)	0.09	1.42	0.11
	Sci Grd (B)	0.09	1.54	0.11
	Abil Grp (C)	0.13	2.94	0.07
	Sci Att (D)	0.07	0.73	0.39
	A and B	0.13	1.37	0.26
	A and C	0.16	2.25	0.11
	B and C	0.22	2.29	0.12
BI	B and D	0.12	1.21	0.30
	C and D	0.15	1.96	0.15
	A, B, and C	0.19	2.04	0.11
	A, B, and D	0.15	1.22	0.31
	A, C, and D	0.18	1.85	0.14
	B, C, and D	0.18	2.00	0.12
	A, B, C, and D	0.20	1.84	0.12
	Gender (A)	0.09	1.42	0.11
	Sci Grd (B)	0.12	2.55	0.09
	Abil Grp (C)	0.13	3.10	0.10
	Sci Att (D)	0.11	2.13	0.10
	A and B	0.12	1.27	0.28
	A and C	0.13	1.56	0.21
	B and C	0.19	3.05	0.05*
A_b	B and D	0.17	2.53	0.08
	C and D	0.18	2.84	0.06
	A, B, and C	0.19	2.02	0.11
	A, B, and D	0.17	1.68	0.17
	A, C, and D	0.18	1.90	0.13
	B, C, and D	0.23	3.06	0.03*
	A, B, C, and D	0.23	2.29	0.06
	Gender (A)	0.00	0.00	0.96
	Sci Grd (B)	0.07	0.87	0.35
	Abil Grp (C)	0.05	0.39	0.53
	Sci Att (D)	0.00	0.00	0.97
	A and B	0.07	0.43	0.65
	A and C	0.05	0.20	0.82
	B and C	0.09	0.67	0.52
SN	B and D	0.07	0.43	0.65
	C and D	0.05	0.20	0.82
	A, B, and C	0.09	0.44	0.72
	A, B, and D	0.07	0.29	0.83
	A, C, and D	0.05	0.13	0.94
	B, C, and D	0.09	0.45	0.72
	A, B, C, and D	0.09	0.33	0.86

Table 4

Significance Test of Regression Effect-Attitude Toward Behavior and Subjective Norm on Intention

Source	Sum of Squares	Deg. of Freedom	Mean Squares	F-ratio	Prob	R^2(adj)
Regression	276.54	2	63.28	60.27	.0001	.407
Residual	365.92	171	1.05			

Table 5

Regression of Attitude Toward Behavior and Subjective Norm on Intention

Source	β	p	r	p
Attitude	.121	.0001	.513	.0001
Subjective Norm	.289	.0001	.363	.0001

Table 6

Significance Test of Regression Effects - Determinants of Attitude Toward Behavior and Subjective Norm (Full Model and β Model)

Variable	Source	Sum of Squares	Deg of Freedom	Mean Squares	F-ratio	Prob	R^2(adj)
A_b	Regression	1981.13	14	141.51	6.39	.0001	.304
	Residual	3522.01	159	22.15			
Ab-β	Regression	1593.30	3	531.10	23.09	.0001	.277
	Residual	3909.84	70	23.00			
SN	Regression	101.04	9	11.23	4.83	.0001	.166
	Residual	380.95	164	2.32			
SN-β	Regression	83.58	2	41.79	17.94	.0001	.164
	Residual	398.39	164	2.32			

Note. In the "β Model" the least significant determinants are stepwise removed until all the remaining β-values surpass the .05 level.

Table 7

Regression of Behavioral Beliefs on Attitude Toward Behavior

Enrolling in one elective science course such as chemistry or physics in high school will . . .	Total Model		β Model	
	β	p	β	p
help me prepare for a future career in science.	.017	.6673	-	ns
cause me to do a lot of homework.	.075	.1739	-	ns
help me get into college.	.147	.0020	.153	.0006
prevent me from engaging in extracurricular activities (if I fail).	.049	.3160	-	ns
cause me to be in a course that is more difficult than other courses.	.001	.8267	-	ns
necessitate my taking additional mathematics courses.	.062	.2633	-	ns
lower my grade point average.	.096	.1433	.155	.0096
help me gain new knowledge about science and the world.	.069	.1935	-	ns
prevent me from taking other elective courses.	.110	.1630	.160	.0126
cause me to be in classes with few girls.	.072	.1232	-	ns
prevent me from graduating from high school on time.	.017	.7862	-	ns
force me to study a lot.	.047	.2925	-	ns
prevent me from being with my friends.	.029	.5086	-	ns
cause me to work with dangerous materials.	-.049	.2912	-	ns

Table 8

Regression of Normative Beliefs on Subjective Norm

Persons who are likely to influence my decision about enrolling in one elective science course such as chemistry or physics are . . .	Full Model		B Model	
	B	p	B	p
my parents (father and/or mother).	.030	.2644	.059	.0002
my science teacher.	.036	.1805	-	ns
high school students.	-.010	.5097	-	ns
college admissions officials.	.023	.0306	.024	.0205
my close friends.	.016	.3993	-	ns
my siblings (brother and/or sister).	-.012	.5156	-	ns
scientists.	.012	.3673	-	ns
my doctor and/or dentist.	-.001	.9227	-	ns
my grandparents (grandfather and/or grandmother).	.001	.7866	-	ns